

2018 mRICH Beam Test Report

June 24 – July 7, 2018, at Fermilab

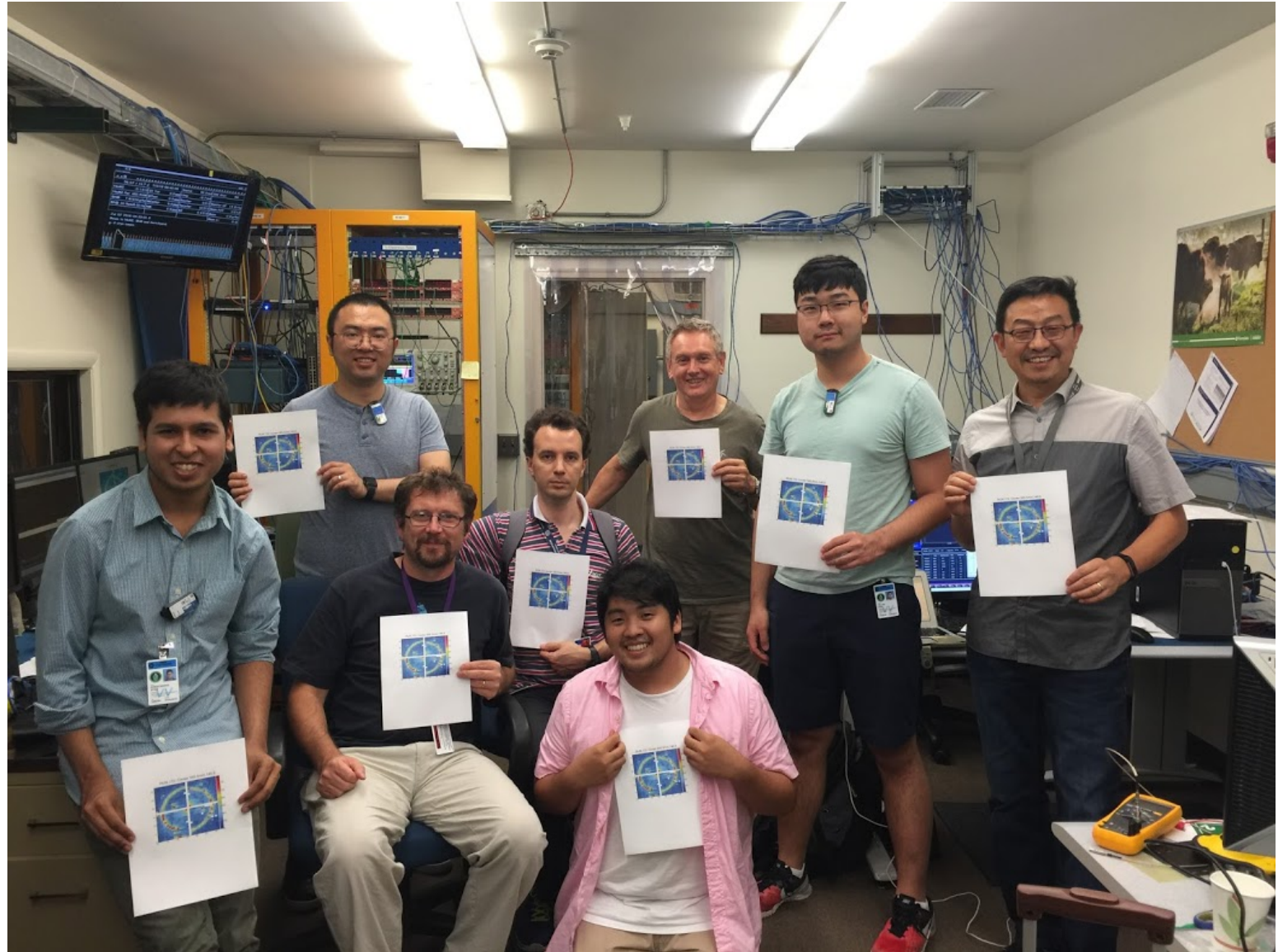
The team members

INFN Group: Marco Contalbrigo, Luca Barion, Vincenzo Lucherini

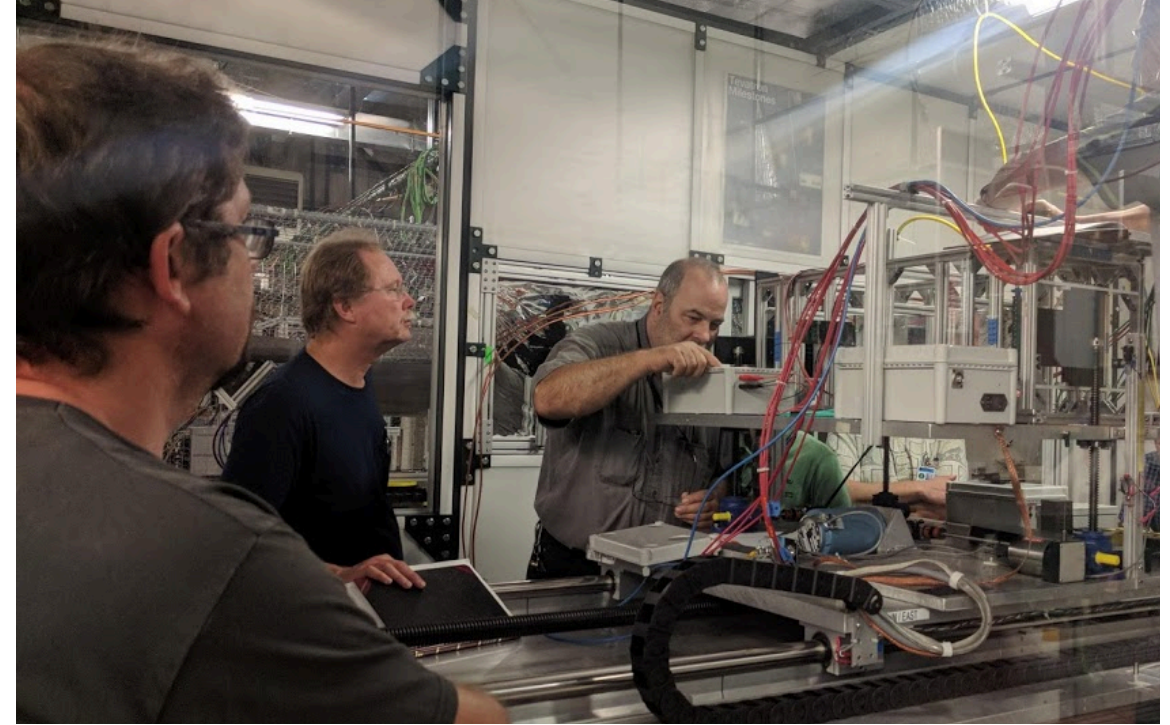
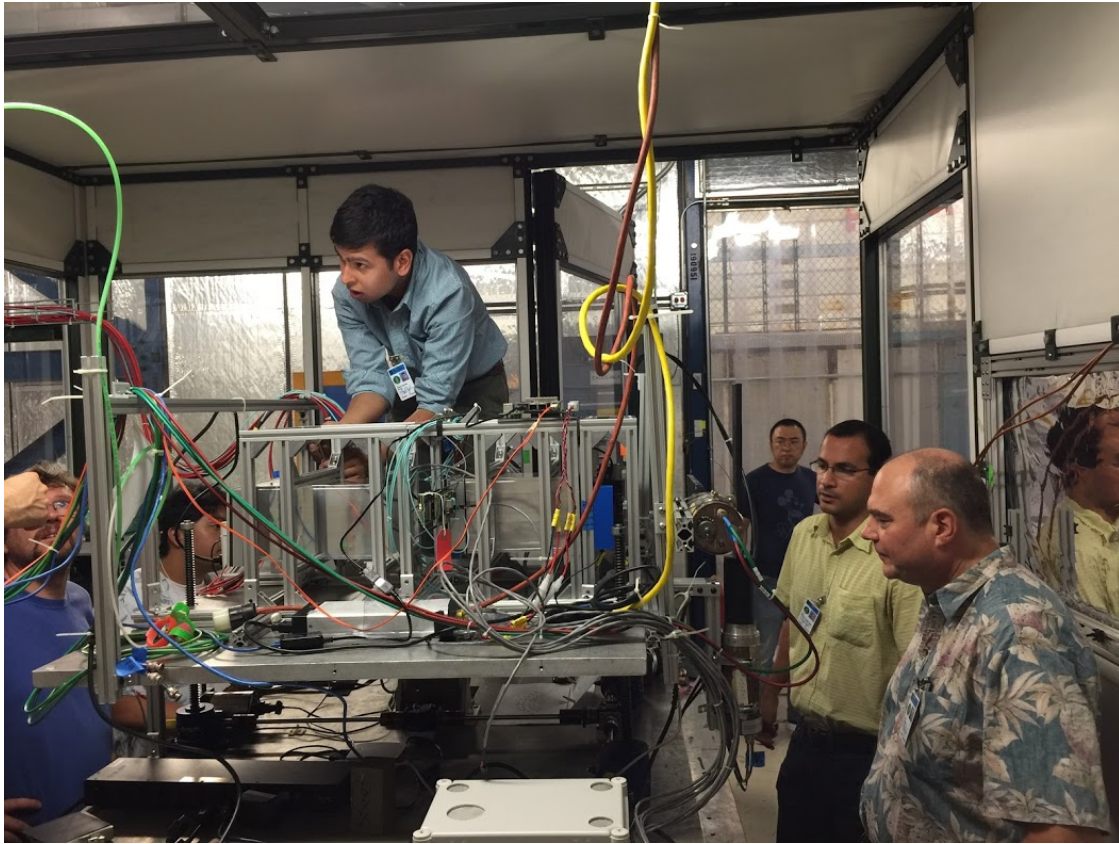
Hawaii Group: Gary Varner, Isar Mostafanezhad, Tommy Lam

GSU Group: Xu Sun, William Roh, Sawaiz Syed, Xiaochun He

Group Photo



Missing member: Gary and Isar



Safety Inspection

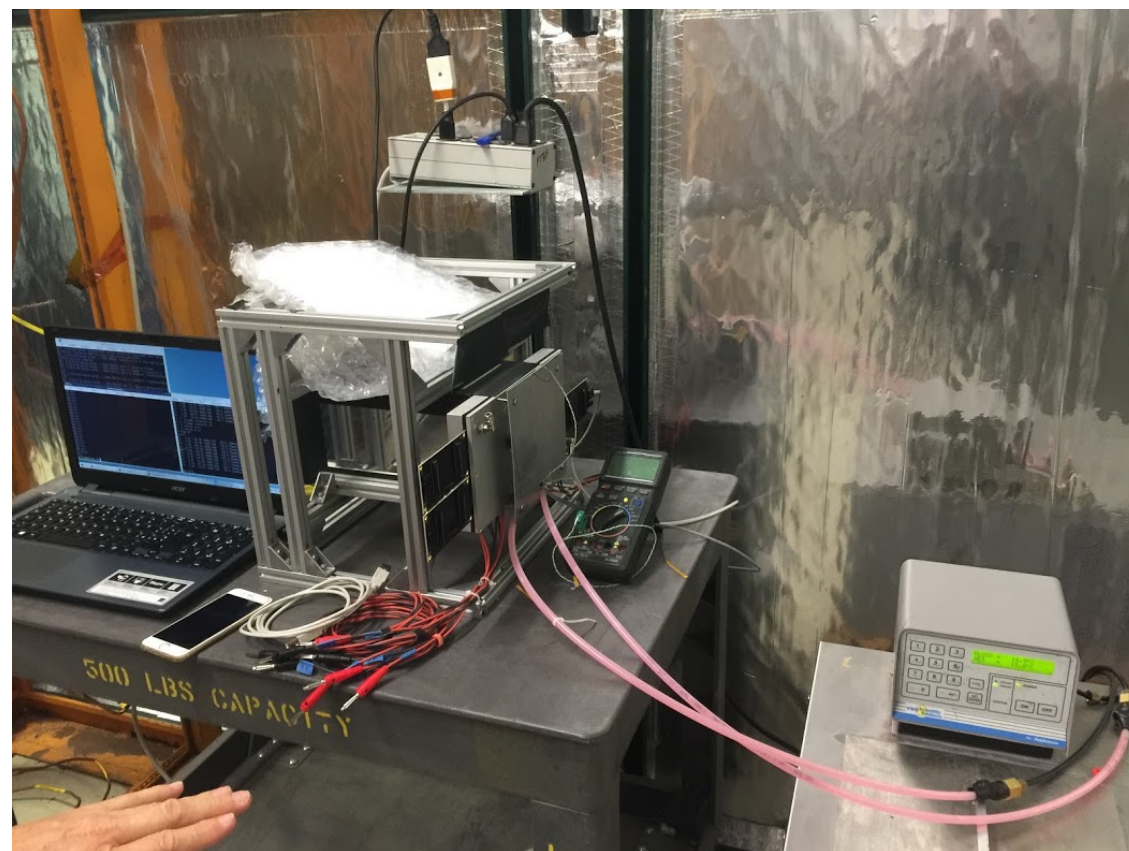
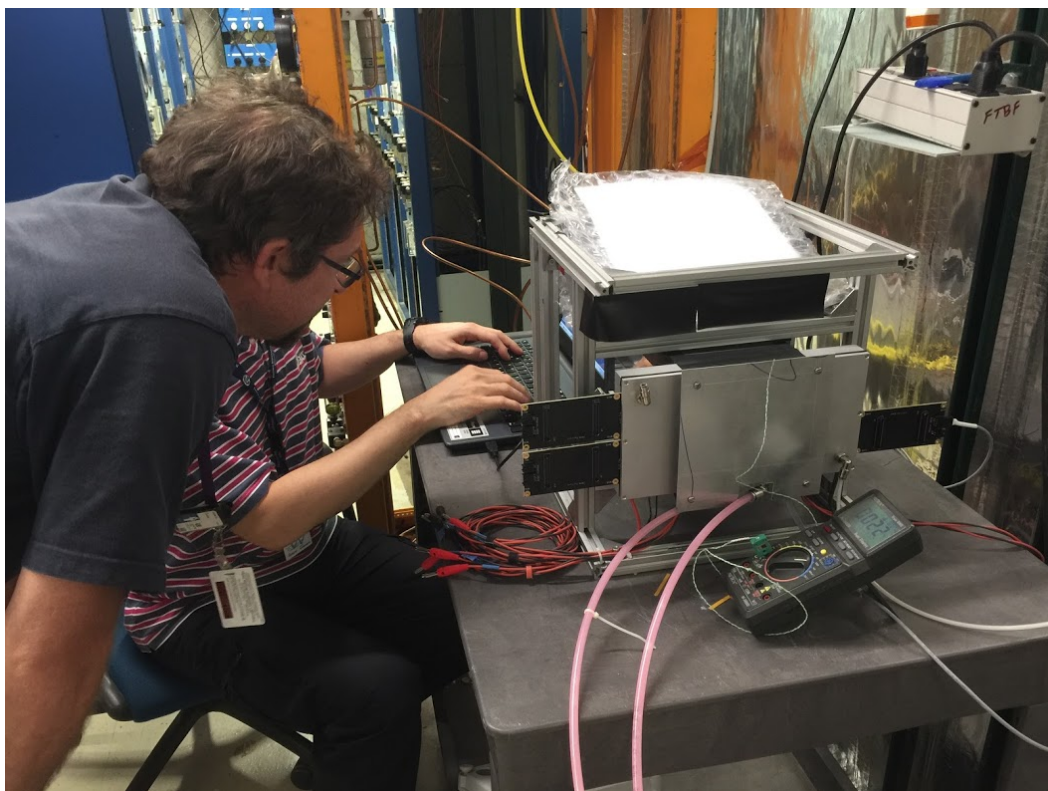
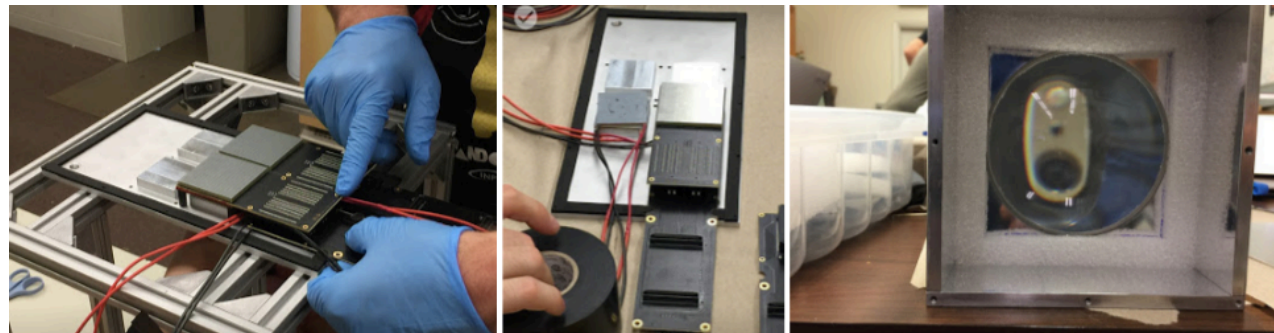
Test Setup

Readout H13700 MAPMTs



SiPM Matrix Readout

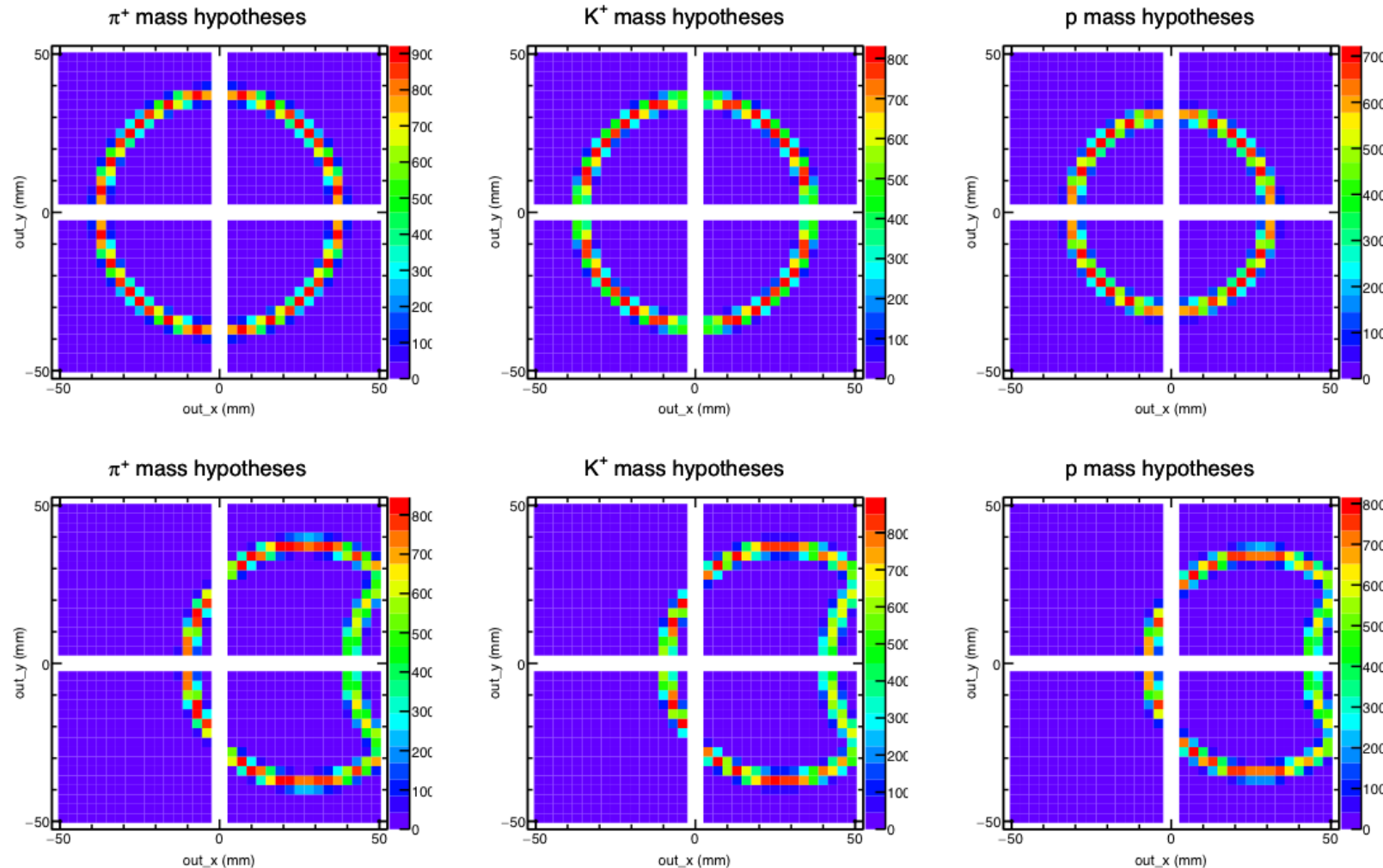
SiPM readout cooling setup test



Stacking Aerogel Blocks



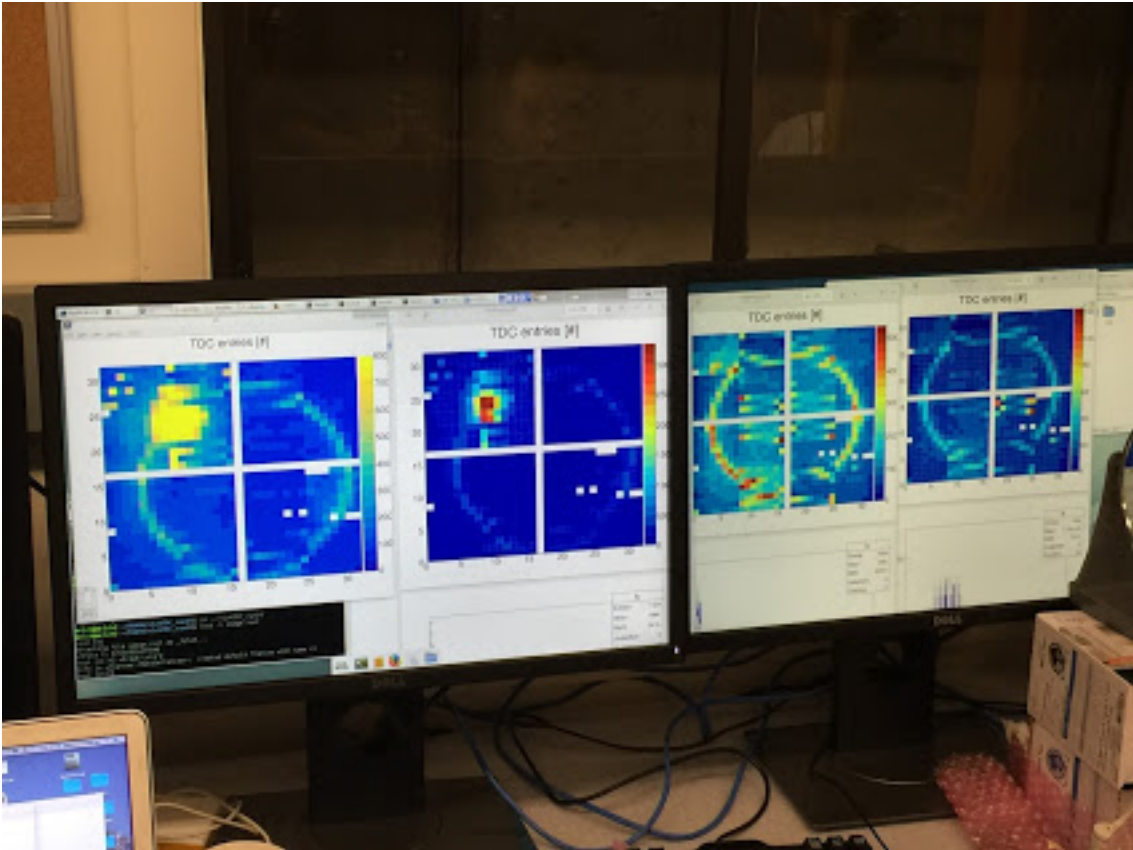
Expectation from Geant4 Simulation



5 GeV/c particles incident
at center at 0 degree angle

5 GeV/c particles incident
at center at 10 degree angle

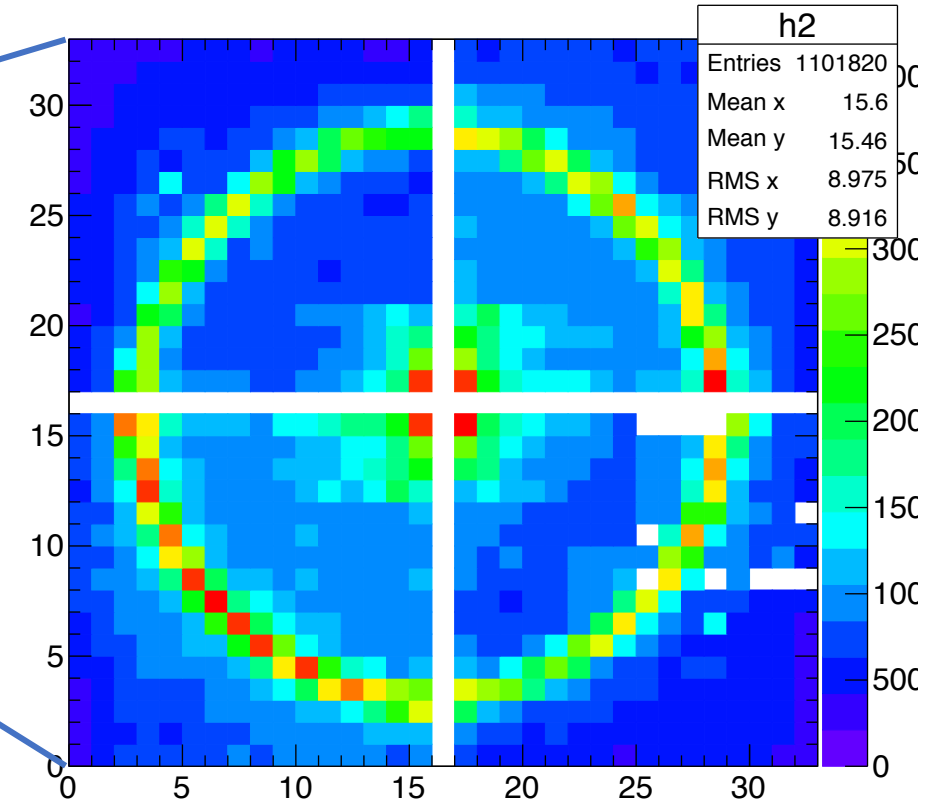
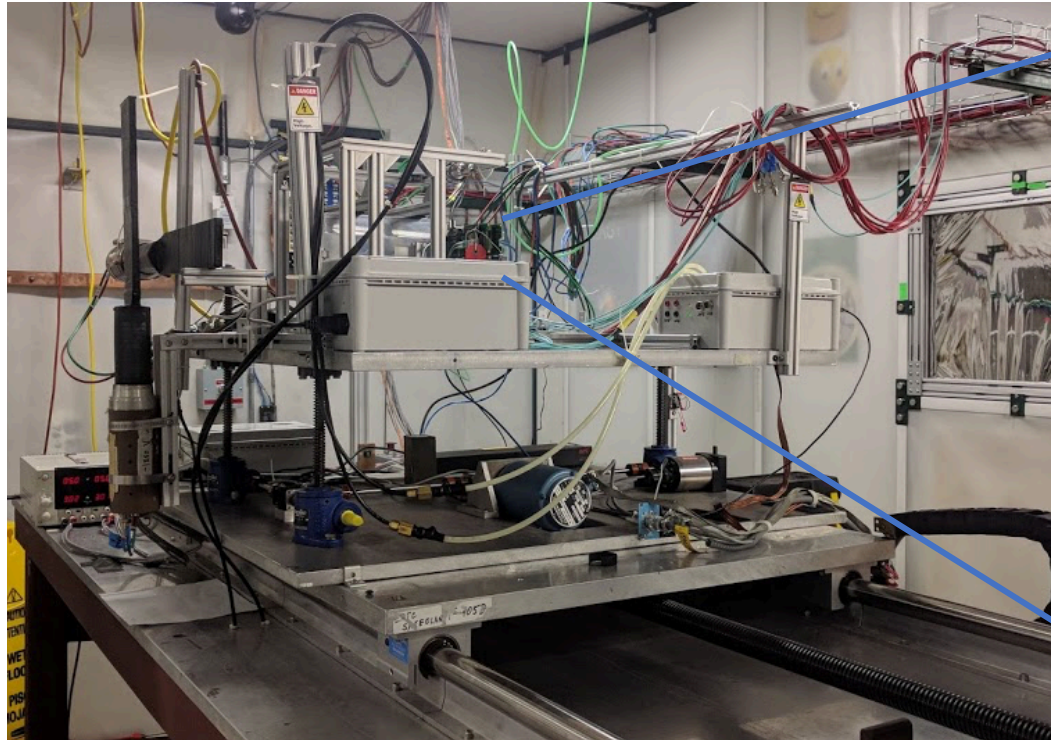
mRICH alignment and image search



Ring Image from 120 GeV/c primary proton beam incident at the center (Preliminary)

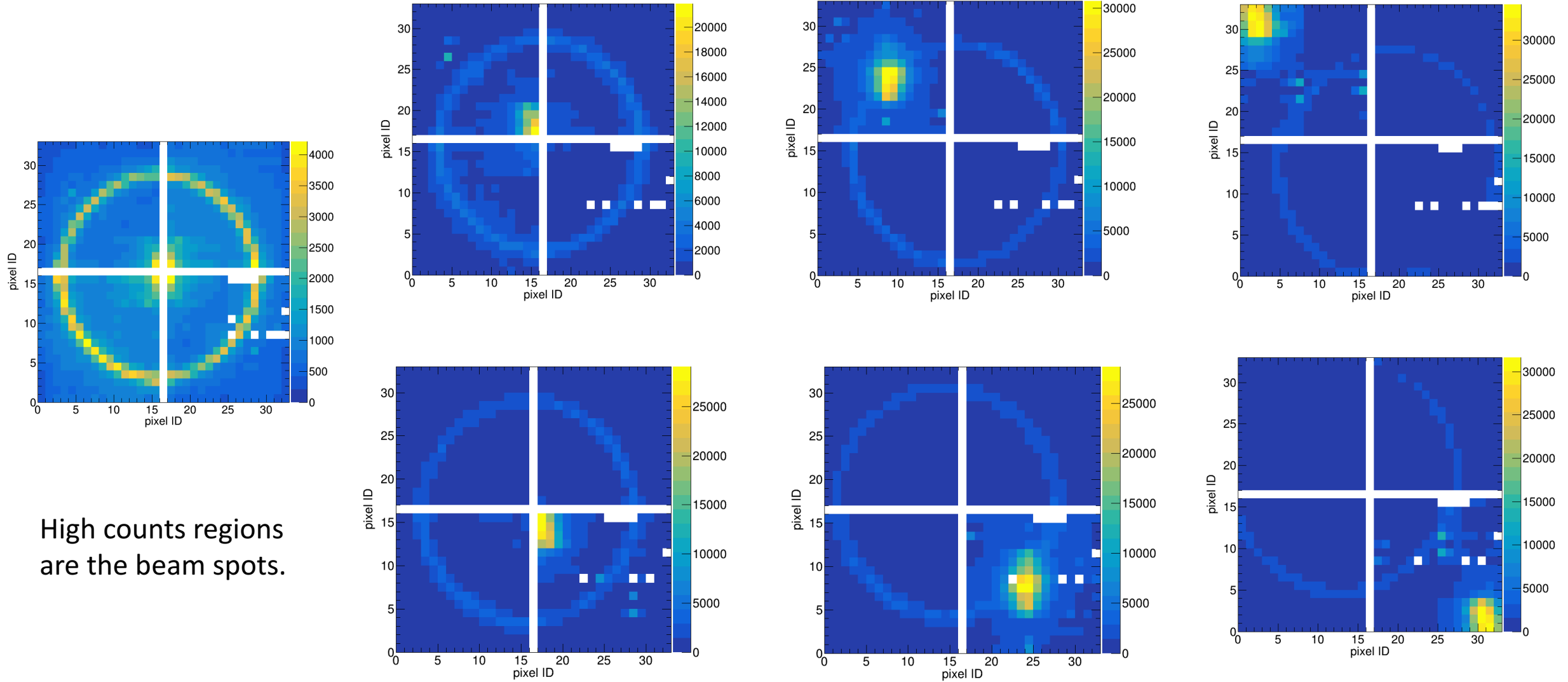


120 GeV/c
proton



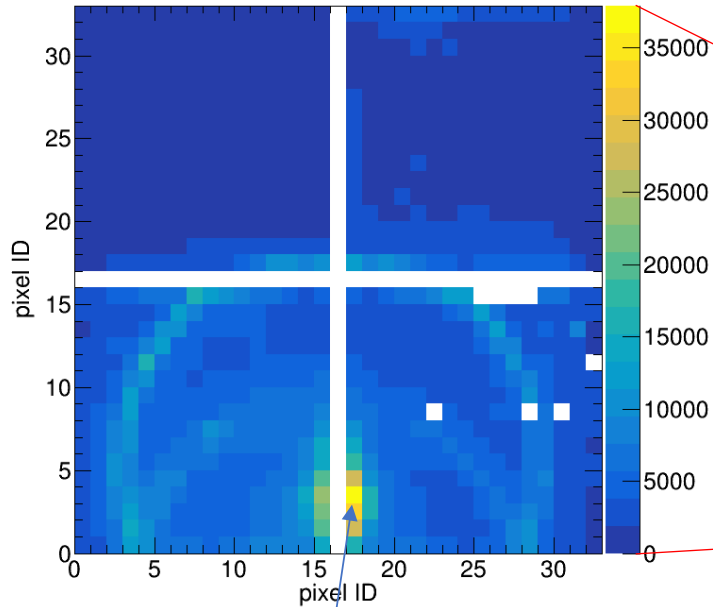
Still need to verify the pixel mapping

Position scans with 120 GeV/c proton beam

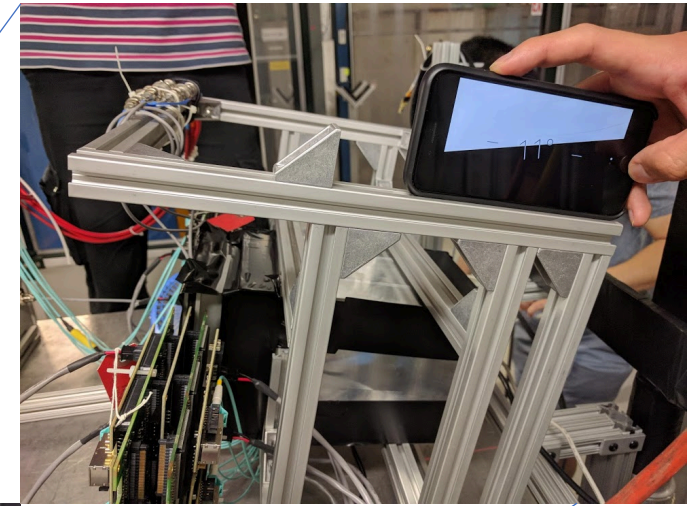
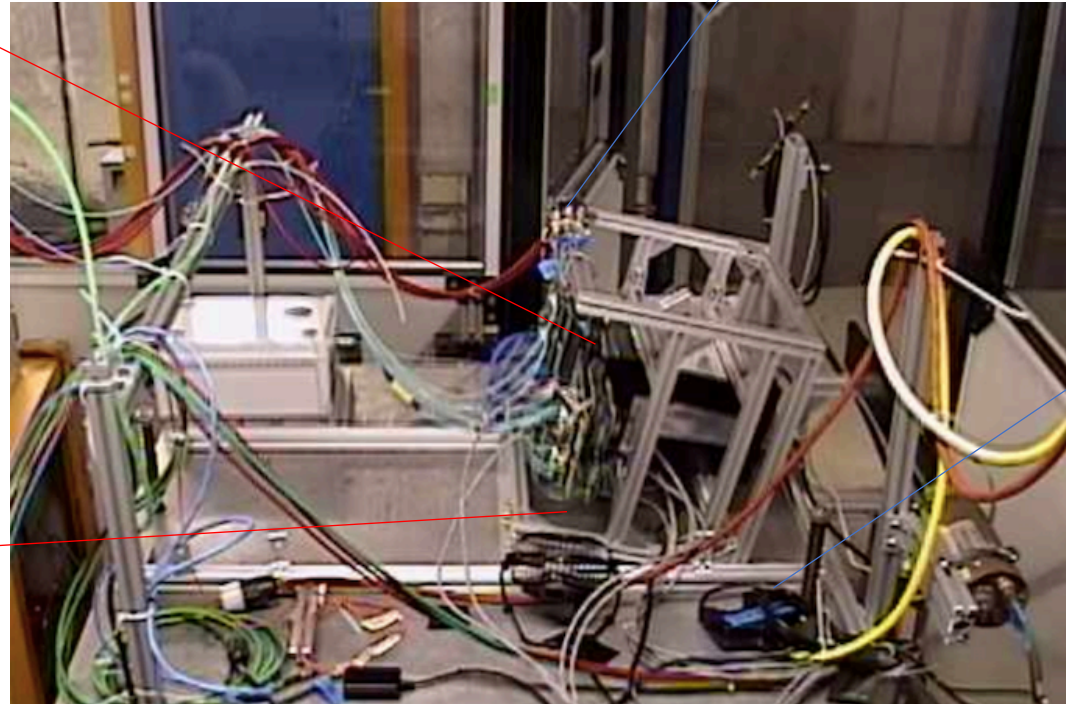


High counts regions
are the beam spots.

Ring image from proton beam at an angle (11°)



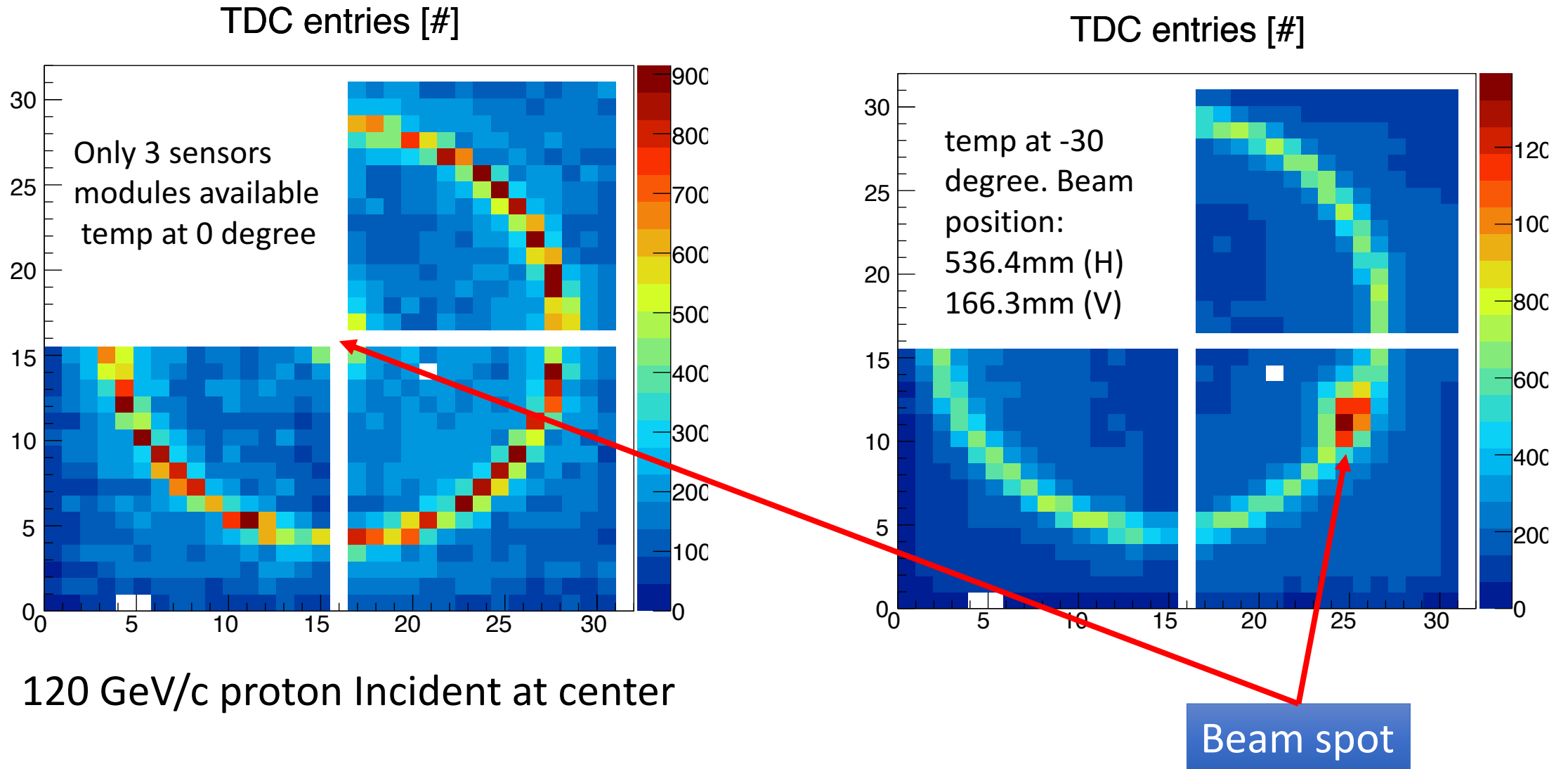
Beam spot



11 degree tilt
downward

←
120 GeV/c proton beam

mRICH readout with SiPM matrix sensors



(each run has 50k events)

Data Set

- ~590 runs with the primary proton beam at 120 GeV/c
 - For detector alignment studies
 - For exploring ring image characteristics with beams incident at different regions of mRICH, including threshold scans.
- 21 runs with 8 GeV/c meson beam
- 13 runs with 5 GeV/c meson beam
- 4 runs with 2 GeV/c meson beam
- ~280 runs with SiPM array readout with 120 GeV/c proton beam (position, temperature and threshold scans).

Summary and To-Do

- The 2018 mRICH beam test is very successful.
- Data QA has started. Data analysis and simulation comparison will be led by Xu Sun (together with Marco Contalbrigo and William Roh).
- It is likely that we need to have another test with working beam hodoscope and K/pi beam triggers. To be determined.

Thanks go to everyone who contributed to this successful test one way or another. The support from the Fermilab FBTF staff members were superb.